NETWORK ROUTER STANDARDS COMMITTEE REPORT

June 1, 1995

EXECUTIVE OVERVIEW

The Governor's Commission on Management and Productivity (COMAP) Report, released August 31, 1994, contains a recommendation to ”consolidate the state telecommunications networks to improve management, planning, operation and expansion of available functions." Toward this objective, the COMAP report proposed five (5) specific recommendations, one of which was to develop network technology standards.

As directed, the Router Standards Committee studied various router equipment and capabilities. Information was obtained from five router vendors, two network integrators and International Data Corporation (IDC). All vendors were provided the same series of questions. Presentations and/or conference calls were held with each vendor. Information obtained from vendors, integrators and agency experience was incorporated into this report.

Technology standards for network communications extend far beyond router equipment. Standards for other essential network equipment, to include DSU/CSUs, intelligent hubs and ware, must be identified in addition to supported network protocols.

Critical in determining network communications standards, the state must specifically define the extent to which "network consolidation" is feasible and practical. Agency missions, network management (central vs. agency), staff resources and training, budget constraints and existing agency investments must be addressed in developing a comprehensive network plan.

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INTRODUCTION

On January 30, 1995, the Office of Administration, Division of Data Processing and Telecommunications, met with state agency data processing representatives to discuss the use of network router technology and protocols. Because of this meeting, a Router Standards Committee was formed to study and evaluate various router technologies with the purpose of recommending standards that should be considered/implemented in a statewide multi-protocol router based network.

BACKGROUND

The COMAP Automation Task Force Recommendation #3 provides that an effort should be undertaken to "consolidate the state telecommunications networks to improve management, planning, operation, and expansion of available functions." To accomplish this objective, the COMAP report recommended the following:

1. Consolidate the management of voice/data/video communication services into the Office of Administration (OA).

2. Consolidate agency network staffing into OA.

3. Develop a statewide communication plan.

4. Develop technology standards related to network communications.

5. OA should develop service level agreements that outline expectations for user voice, data and video network services.

As directed, this report addresses only network router technology standards. Technology standards (item #4 above) would also apply to other essential network hardware such as DSU/CSUs, communication hubs, etc. Software standards for communications protocols, network security and network management must also be addressed. Network equipment maintenance, central vs. agency administration, migration and/or upgrade of installed equipment base to interoperate into a consolidated network environment and agency procurement during the transition to a consolidated network are additional areas that need to be addressed in a plan for a consolidated communications network.

In researching router technology, the Router Standards Committee discussed at length the COMAP recommendation of 'network consolidation." In implementing any consolidation, there must be consideration given to the existing router equipment now installed by state agencies.

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Network standards adopted must recognize the substantial state agency investment in various router equipment and associated components. Development of a consolidation network plan should enable state agencies to utilize to obsolescence or upgrade (with appropriate budget resources) existing installed router equipment.

Development of a consolidated network should only be undertaken after completion of a comprehensive study and plan (item #3 above) to specifically define "network consolidation." Critical missions of state agencies, educational institutions and non-state agencies needing access to state information must be specifically defined. Changing technologies, use of private or public transmission facilities, management control and organization, and budget issues must also be included in a network plan. Short-term transitional and a long-term strategic action items that will move the state to a "consolidated network" must be delineated in the study.

CONMITTEE APPROACH

The Router Standards Committee complied information from the following sources:

1. Presentations and discussions with non-vendor communications experts from SprintUnited Telephone, MCI, Memorex-Telex, and International Data Corporation (IDC)

2. Structured technical presentations and written technical responses from vendors marketing routers (Bay Networks (merged company of SynOptics and Wellfleet), IBM, RacalDataComm, Porteon, and Cisco)

3. Agency experience

This report addresses minimum router functions and capabilities that should be considered as standards. Vendor names and comparisons of different vendor router products are not included in this report. Only router standards identified by the Router Standards Committee are included. Included also are management and interoperability issues and options that are essential to router deployment.

COMMMEE REPORT

June 1, 1995

COMMITTEE MEMBERS

Jim Wiley - Conservation
Nancy Bochat - OA DP&T
Gammon McClure - DMH
Stan Heckman - MSHP
Pete Wieberg - DOH
Scott Brodbeck - DNR
Frank Senter - MHTD
Marilyn Gerrard-Hartman - OA DP&T
Ron Call - DOR
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RECOMMENDED STANDARDS

Management (Centralized vs. Agency)

At this time, there is no definition of what will be centrally managed on a statewide network, vs. what would still be managed by state agencies. We will address network management from an overall view, regardless of where the line of management begins and ends.

For the sake of this document, the most emphasis is on routers and equipment used to make wide-area connections. The routing standards contained in this report apply also to LAN-based router configurations.

The router is one function in a network connection. The digital circuit, the DSU/CSU, the router, and the intelligent hub (if used) make u-p the components of the normal wide-area network connected and must utilize a common management strategy. A general SNMP-based management package with features that allow the monitoring of circuit status, DSU/CSU status, router status, and intelligent hub is necessary for effective wide-area management. This package, in addition to Net View for SNA management, should be used as the total management tools necessary for network management and troubleshooting. SNMP-2 level management should be required as soon as possible.

The overall package, for example, would not only track circuit quality and status, but would allow monitoring staff to access DSU/CSU's, routers, and hubs at remote locations for configuration changes, software revisions, problem determination, etc.

Remote configuration, software downloads, and warm restart must be available to enable centralized configuration and management, and reduce travel costs for hardware/software maintenance. Problem tracking statistics and accounting should be available from the management software.

IP accounting for cost allocation and billing is recognized as resource-intensive at the router level, but may be highly desirable for cost sharing between state agencies or within individual agencies in a consolidated network environment.

Software Capabilities

The router software is a complex area of discussion. Even though all vendors speak in terms of RFC compliance, proprietary implementations and value-added features are the normal end product, in most instances. It should be required that the vendors address backward-compatibility within upgrades on their own software and hardware. For example, new DLSW routing software must be backward compatible with previous releases for the same vendor.

From a standards view, meeting RFC standards with multi-vendor solutions creates situations where compatibility and interoperability will be major issues. Backward compatible compliance to the RFC's from a proprietary implementation would be necessary in order to ensure the compatibility and interoperability in any consolidated network operating beyond a basic scale of operation. For example, TCP/IP on a point-to-point link may be easy to achieve in a multi-vendor solution, using the assumption that the state is using a single-protocol network. In contrast, data-link switching over a frame-relay connection in a multi-vendor environment opens up several areas of compatibility concerns. Compatibility and interoperability become a double-edged sword: on the one hand, compatibility and interoperability that is attained at the basic RFC level, may result in the loss of proprietary features that could greatly enhance network performanc6Md op6ra'tion.

At this point, the committee can only recommend requiring that the router software meet the following specific RFC standards, and be interoperable with other vendors at the basic RFC level:

* Open Shortest Path First (OSPF, RFC 1583)
* DLSW Ver. 1 (RFC 1434 with LAN protocol prioritization), SNA and NetBIOS encapsulation within IP packets
* Multiprotocol encapsulation over frame relay (RFC 1490)

It is also felt that the router vendor(s) must make a commitment to implementing APN/HPR as a routing option in the next 12 –18 months. Also, Boundary Access Node (BAN) is a desirable feature (frame relay from a remote router directly into a 3745 front-end processor).

The committee recommends that any statewide network backbone handle a maximum of 2-3 protocols. The most frequently mentioned are IP, SNA, and IPX. Any router on the network should be able to transmit all wide-area network packets in one of the above protocols. For internal LAN purposes, many other protocols should be supported (e.g., DECnet, EtherTalk, etc.).

For the purposes of frame relay connections, the router must support the LMI and Annex D implementations.

Network and protocol filtering parameters must be available on all router ports in order to serve security and traffic control functions at the router level. Inclusive and exclusive filtering is necessary.

Protocol prioritization for time-sensitive packets (SNA, etc.) must be available.

The router must perform simultaneous routing and bridging.

The router must provide the following network attachments: Token Ring, Ethernet and Serial. It is highly desirable that other LAN options such as 10OBaseX, Fast Ethernet, FDDI, and ATM be stated as options available currently or within the next 12-24 months.

The router must provide the following communications attachments: PPP, Frame Relay, SMDS, ATM, ISDN, Dial-on-demand, Dial-backup, and other communication options currently available or projected within 24 hours should be identified by the router vendor.

It is highly desirable that all routers for the vendor use the same configuration software. It is expected that router software can be installed/updated in at least one of the following manners: BootP, FTP, TFTP.

The router must have the ability to dynamically configure and start port/protocol/function definitions without restarting the router. These capabilities must be available by dial-in-port, through the data network (in band) and locally. It is desirable that the router has varying levels of login/password security for software configuration.

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Hardware Capabilities

Routers must be available in a variety of configurations: large central office hub (7 or more slots), medium-size hub (3-5 slots), and branch office router (1-2 LAN and 2-4 WAN connections).

In order to enhance the migration of current SNA networks, the router must be capable of physically connecting to an SDLC device, such as a cluster controller, into a serial port and doing SDLC/LLC2 conversion over the network. It is also desirable that multi-drop circuits be able to be connected to the router.

The ability to channel-attach the router is desirable.

Maintenance/Support

A single vendor should be responsible for router, DSU/CSU, and hub installation, maintenance and troubleshooting. There should be a single point of contact for service and support calls. Actual responsibilities for installation, maintenance, and troubleshooting will be dependent on the network architecture adopted by the state and the management responsibilities retained by state agencies within the network.

Spare parts depots should be located in Jefferson City and the various large service areas of Missouri.

Lease/purchase, purchase, extended warranties and varying levels of ongoing procurement and maintenance contracts must be available.

It is expected that router software upgrade and patch notifications will be made by the vendor to the proper network managers. FTP sites, etc., are helpful, but the vendor is still expected to give notification when changes and fixes occur.

SUMMARY

There are several options in regard to router-based networks the State of Missouri could pursue at this time.

Option 1 - Single network vendor, central management

The state would need to make a decision dictating a single vendor who could meet the router software, hardware, maintenance, and management requirements outlined above.

A bid written by the Office of Administration would be used as the statewide contract for routers, DSU/CSU's, hubs, and related hardware and software components.

Resources would need to be made available to the Office of Administration in order to set up a group to monitor the statewide network and create solutions that will benefit all agencies operating throughout the state.

The advantages of this approach include consistent platforms, training, and management across the state government network, with a consistent approach to networking enforced throughout the agencies, whether at the central office or remote sites. Compatibility and interoperability issues fall back on a single vendor. The sharing of equipment and circuits in the remote, rural areas served by several agencies will become more feasible.

The disadvantages include having to provide funding over a short period of time to replace the base of installed router equipment already existing among various state agencies. This migration will be a difficult process as the agencies try to maintain an existing router-based network while migrating to new networking standards.

If the COMAP goal of an integrated, consolidated network is to be realized, this approach is probably the most logical, but also the most painful to implement. Realistically, this option will take approximately 12 months to begin implementation. A totally integrated statewide network would take at least 5 to 7 years to implement, provided the necessary resources are made available.

Option 2 - Multiple network vendors, agency management

Under this option, the agencies would continue to bid, install, and maintain their networks as they see necessary, without any central management functions.

The advantages of this approach include better tuning of equipment and software to specific agency needs. Compatibility and interoperability issues are only applicable within the given agency. Any connection to another agency with different equipment will be a negotiated process. Funding for replacement of existing equipment would not be necessary.

The disadvantages include having disparate networking methods and expertise among the various state agencies. While this may not be as large an issue at the central sites, it becomes a larger issue at remote, rural sites, where agencies must provide their own support staff for each proprietary solution. The sharing of equipment and circuits will not be as feasible or easily managed.

To stimulate an integrated network solution, where a site can access all state government services via a single connection, a high-speed backbone connecting the data centers and other data repositories in the Jefferson City area may become necessary.

While this option would not meet the COMAP goal of an integrated network, the lack of a centralized authority for networking standards and ongoing standards enforcement/monitoring make this option more attainable than option 1.

Option 3 -- Multiple network vendors, agency management, interoperability requirements

Under this option, the agencies would continue to bid, install, and maintain their networks as they see necessary, without any central management functions. Multi-vendor connections would have to meet pre-defined interoperability requirements.

The advantages of this approach are the same as option 2.

The disadvantages are also similar to option 2.

A central authority would need to be available for arbitration when multi-vendor solutions between (or within) agencies do not interoperate according to predefined specifications.

While this option also would not meet the COMAP goal of an integrated network, some level of interoperability could be negotiated.

CONCLUSION

The industry will probably be taking a turn away from routing in the future, to facilitate higher-speed switching technologies. A conversion from multi-drop analog circuits to router-based digital networks utilizing frame relay is probably the next intermediate step, as protocol services are required by the state agencies.

Directional decisions toward a statewide network will have significant impact on the recommendations made here. For router-based networks to be most effective, more sharing of circuits and equipment must take place at the service points throughout the state, especially in rural areas where the cost of providing digital/multiprotocol services are the highest. Expanding the IVDN and employing frame relay technologies where applicable, or outsourcing the telecommunications function will impact the deployment rate and costs associated with implementing a router-based network.

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The consolidation into a statewide, centrally managed network will be a difficult transition for agencies that already have substantial installed bases of router equipment. Funding, manpower, and retraining must be carefully considered. Any plan adopted to move toward a statewide-consolidated state network must be fully funded to be successful.

Issues such as possible network outsourcing and the rapidly changing technologies of communications must also be considered and incorporated into a statewide network consolidation effort. Router standard recommendations contained in this report are the best conclusions of the committee at this time.

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GLOSSARY

APPC	Advanced Program-to-Program Communications
APPN	Advanced Peer-to-Peer Networking
ATM	Asynchronous Transfer Mode
CSU	Channel Service Unit
DLS	Data Link Switching
DSU	Data Service Unit
Ethernet	A baseband LAN specification invented by Xerox Corporation which operate at 10 Mbps using CSMA/CD to run over coaxial cable
FDDI	Fiber Distributed Data Interface
FTP	File Transfer Protocol
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
IPX	Internet Packet Exchange
LMI	Local Management Interface
LU 6.2	Logical Unit 6.2
RFC	Request For Comment
SDLC	Synchronous Data Link Control
SNA	Systems Network Architecture
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
Token Ring	A token-passing LAN developed and supported by IBM which runs at 4 to 16 Mbps over a star topology

STATE OF MISSOURI
DATA PROCESSING MANAGERS

Report on Statewide Implementation of Imaging
Proposal of Pilot Projects

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August 23, 1994

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INTRODUCTION

The initiative for the DP manager's Committee to address new technological advances through research of combined project efforts came from both within the Committee and the Missouri Legislature. This particular effort focuses on imaging, a relatively new technology being studied by a number of agencies. Imaging has the potential to significantly impact the way the State as a whole does business. Each agency has independently recognized the potential benefits of imaging and has, to varying degrees, studied the possibilities within their own organizational environment. What the DP Manager's recognized was the fact that significant savings could be possible if there were a consolidated effort to collectively set the parameters for statewide image implementation. Additionally, representatives of the Missouri Legislature approached the Group to suggest that their Body would be willing to entertain the submission of a collective funding request that would address technology implementation as a statewide research effort, as opposed to independent efforts which would most likely result in dissimilar implementations. In response, the DP Manager's Group commissioned its Statewide Imaging Subcommittee to study the collective, cooperative implementation of imaging in State government.

STANDARDS AND SHARING

The Statewide Imaging Subcommittee addressed a number of issues in their deliberations. Two issues consistently surfaced as common themes in all discussions, the need for statewide standards and the need for resource sharing. The Subcommittee sensed a definite need for standards and sharing in the areas of hardware implementation, software selection, network administration, and image technology management policies.

Hardware Standards

In discussing hardware options, the Subcommittee felt that there was a need to include mainframe, midrange, and micro platforms. The need for the mainframe environment was to index data resident in legacy systems with newly captured images. The need for the midrange environment was multi-faceted; to provide the execution environment for imaging software, to provide access to stored images, to operate as the server for client/server image applications, and to preserve investments in existing computing operations were among the needs discussed. The need for the micro platform was obvious as it is at that level the capture, retrieval, and display functions of imaging are most commonly present.

Software Standards

Software selection standards received considerable attention. It was the prevailing opinion of the Subcommittee that single software solutions be identified for the both the mainframe and midrange platforms. Given the State's common mainframe and midrange operational environments, i.e., the mainframe IBM 370 architecture family and the midrange AS/400 family, it was felt that the software installed at any of the current installations should be the same. Indexing software for the mainframe and principal imaging software for the AS/400 were discussed as the most cost effective and most sharable solutions for the State.

Micro solutions as either a standalone operation or as a client operation in a client/server environment will need to be more flexible. The Subcommittee felt that at this level, mission specific solutions were needed. In discussing mission specific solutions, it was the consensus that while multiple solutions were necessary, it was not necessary to promote an open-ended policy for image acquisition. Unattended, the acquisition of micro platform imaging solutions could be as numerous as there are

departments. The Subcommittee discussed techniques for insuring that micro platform imaging solutions be limited to a reasonable number of solutions that are sharable among and across agencies, yet functional within an agency. Micro platform solutions should realistically be limited to three to five products.

Finally, the Subcommittee expressed the concerns about the compatibility of imaging solutions as the technology crossed platform environments. It is the opinion of the Subcommittee members that any and all solutions must adhere to a standard that mandates cross platform communication and integration.

Network Standards

Management of the data network to facilitate the transmission of images was an issue the Subcommittee felt would essentially be administered under the present data network administration arrangement within state government. With the bulk of the network already upgraded to digital standards, the transmission of images will be a bandwidth issue rather than a management policy issue. The most significant point the Subcommittee felt necessary to make was that the current network managers need to be prepared for the anticipated bandwidth spike that can be expected. It will not be an issue of network extension or expansion rather an immediate request for vertical capacity increase. It is the feeling of the Subcommittee that the current 56 KB capacity will not be sufficient to meet the demands of image users. It is anticipated that in order to meet minimum response time expectations, the transmission speeds will need to be in excess of the 128 KB capacity. To this end, network managers should immediately begin discussions to plan for the vertical jump necessary to accommodate image transmission. Additionally, the Subcommittee felt it necessary to state that it is extremely important that network managers devote equal or accelerated attention to image network demands as was/is devoted to data and voice network needs.

Management Policy

The management of imaging standards will in all likelihood be one of the most challenging issues facing administrators. How will agencies share information, how will agencies acquire imaging products while adhering to statewide standards, how will imaging research continue from a multi-agency perspective. These are issues that need management attention. Several concepts addressing these issues were discussed and it was the final consensus of the Subcommittee members that an Imaging User Group be commissioned, under the control of the DP Managers Group, whose mission would be the management of Missouri's imaging initiative. The concept of having imaging managed from a peer group perspective received the overall support of the Subcommittee.

SECURITY AND ACCESS

In discussing security issues, there was not much attention devoted to the physical security of imaging datasets, as the state is now capable of providing that level of security in any of the data centers. It was the general consensus of the committee members that physical dataset security would be an issue between the image processing agency and the image service providing agency and that acceptable mechanisms exist today to accommodate all parties, most notably through service agreements and/or Missouri Code of State Regulations concerning the use of confidential computerized personal information.

Public access to stored images is an issue that will undoubtedly require additional research. There are many facets to public access to information; development of request procedures, charging for

materials, charging for services, development of access programs and indices, statutory changes, etc. Each issue will in all likelihood have unique characteristics within each department. There is undeniably a growing public demand for information and services. Imaging will provide efficiencies in meeting this demand, in fact, over time this may be the area where the State can realize the biggest return on investment, but it will not be without initial cost to the State. Each agency planning to implement imaging must be aware of the potential impact of public access.

PROJECT CANDIDATES

By way of correspondence, the Subcommittee requested input from the Data Processing Managers concerning those projects that they would like to see considered as pilot projects. Responses were received from nine departments with six of the departments responding positively with eighteen candidate projects. The projects submitted are as follows:

Department of Health

MOHSAIC Imaging Interface: The Missouri Health Strategic Architecture's and Information Cooperative Project (MOHSAIC) is implementing and Information Strategy Plan and it includes integrated information to meet the needs of multiple users. Imaging system services could supplement MOHSAIC benefits by facilitating information capture and work flow operation, eliminating high volumes of paper handling and storage, and ultimately reducing service delivery times. Some of the health programs that could benefit from image processing services are Vital Records, Immunizations, Communicable Diseases, Tuberculosis, Sexually Transmitted Diseases, Prenatal and Child Health, WIC, and Children with Special Health Care Needs. When completed, the imaging project needs to:

- Link or integrate the Imaging System with the DOH Network
- Improve the work flow of health information processing
- Eliminate major portions of the data entry, paper handling, and paper storage currently required
- Improve delivery of service to health clients
- Improve capacity to evaluate how programs accomplish agency objective

Department of Economic Development

Division of Professional Registration - License Renewal: There are approximately 300,000 professional licenses in the State of Missouri that are renewed on an annual basis. This exercise involves more than 40 professions (certified public accountants, M.D.'s, D.O.'s, professional engineers) and 28 boards. The license renewal process accommodates a turnaround document produced by the State and any relevant documentation submitted by the licensees to a central receiving room (CRR). An image system is being investigated which would enable the CRR to capture the submitted documents, automate the renewal processing, and make the relevant documents available to the respective boards. This would expedite the processing of renewals, decrease accounting errors, reduce the loss and misfiling of renewal documents and enable the information to be made available to multiple users.

PSC Utility Findings: The investor owned utilities doing business in the State of Missouri are required by law to have a current approved filing of their tariffs on file with the Public Service Commission. These tariffs are dynamic documents often requiring the review of engineers, accountants, economists and lawyers. The tariffs may also be the subject of a hearing before the PSC. The PSC has one tariff file but multiple office locations. An image system, which would enable the current tariff filings to be available to many employees at different locations, would expedite the review process and enable more effective service to be provided to the public.

Office of the Director - Project Tracking: The Department of Economic Development has several hundred business expansion, retention, relocation and start up projects in operation at any one time. There are a number of documents that are kept on file for each project. Information is submitted by the businesses, by Department employees, by other government agencies, by colleges and universities, by the local communities and by the press. These files are very dynamic and often reviewed and processed by a number of business and public sector officials. An image system would enable them to capture these documents and make them available to the various parties requiring the information. This system would assist the Department in growing businesses throughout the State of Missouri.

Division of Finance - Bank Examination Reports: The Division of Finance examines every Missouri bank on an annual basis. Various documents are filed along with the examination reports and then accessed by Division personnel located throughout the State. An image system would address the workflow problems associated with the current process.

Division of Tourism - Promotional File of Tourist Brochures:

Division of Job Development and Training - Job Training File:

Administration - Personnel File:

Division of Liquor Control

Licensing File: The areas of Liquor Control operations that are affected by this project include liquor licensing, liquor, wine, and beer brand registration, correspondence, and administrative forms management. Liquor licensing files are growing rapidly. The bulk of the files' consist of license application forms, supporting documents, and photographs. These documents are in frequent demand and the rate of inquiry continues to increase. Inquiries are received from various State Divisions, liquor industry members, and litigation officials. Efficient access and quality reproduction capabilities are a necessity in managing liquor license documents.

Liquor, wine, and beer brand registration management requires that a copy of the product label be on file with the Division of Liquor Control. Documents supporting the management of brand registration are necessary to insure proper registration of products in Missouri. These files are growing rapidly and with administrative access increasing electronic storage and access have become critical to being able to the Division's ability to provide efficient services in this area.

Correspondence and administrative documents, i.e., expense accounts, time sheets, purchase orders, etc., are too voluminous to effectively manage in paper form. The need for imaging is very real in this area if the Division is to continue to be effective.

In each of the four areas identified imaging technology will provide a much-needed solution to the problems of workflow efficiency, document retrieval, and physical storage.

Audit Findings:

Fiscal Records:

Administration Records:

District Records:

Department of Natural Resources

The Department of Natural Resources (DNR) is in the process of conducting an Information Strategic Plan (ISP) for the entire department. At this time, there are several projects that are being considered as the document imaging pilot projects. Because the ISP process is not complete at this time, the Hazardous Waste Program document-imaging project may not be identified as the most critical need for FY96. In every instance however, the projects undertaken at DNR will be consistent with recommended Action Items of this document. In addition, DNR's objective is to implement citizen access to the information and the Information Engineering Facility (IEF) methodology as an integrated feature of all future projects.

Hazardous Waste Program: The Department of Natural Resources has reviewed the filing system used within the Division of Environmental Quality (DEQ). The division's filing system cannot keep pace with the volume of paper it is required to maintain by State and Federal legislation. In addition, the central filing system contains an estimated 26 million document pages. Duplicates of many of the documents are required at other sites, i.e., St. Louis, Kansas City, Springfield, Washington, etc. DNR plans to begin the implementation of document imaging in the Hazardous Waste Program of DEQ. The program has been chosen because it has the equivalent of 3,300,000 paper documents and receives another 2,000 documents per day, (4,000 on a peak day). The program has also gone through a file reorganization and purging effort in the past two years resulting in:

- A computer file indexing application
- The staff has access to the file index on DNR's local area network
- Elimination of duplicate and extraneous documents

Office of **Administration**

Division of Personnel Imaging: The Division of Personnel needs to significantly upgrade its data processing and office automation capabilities. This will enable staff to be more fully productive and to meet the information needs of our customers. While other agencies have upgraded their capabilities two or even three times, the Division of Personnel has never truly completed a first implementation. This project is designed to implement the upgrade and completion of Division of

Personnel data processing and office automation capabilities. The project includes two categories of office automation capabilities:

New Workstations: Purchase of 15 new AS/400 compatible workstations to expand our use of current office of Administration systems. This workstation base would be necessary for the "imaging system" and the other capabilities provided.

Imaging System: An employment application imaging system, including in-house processor and storage, to support important services to our application and agency customers. An imaging system is essential to supporting the Department of Mental Health's "Reinventing Government" initiatives for the development of a new selection system based on a database of skills and for the provision of applications to agencies.

Department of Corrections

Probation and Parole Workflow: The Board of Probation and Parole in studying an efficient approach to workflow has the following goals:

- Document a representative current workflow and procedure
- Identify the problems associated with a paper-based system
- Propose a representative paperless environment workflow
- Document benefits associated with implementing a paperless environment

Any paper-based system is fraught with problems associated with that media: long retrieval times when a client is on the phone and an answer is needed; manpower needed to file the paper in the proper order in the folder, then to file the folder, and to retrieve it again when it's need; misfiling resulting in lost time; proper storage to maintain the quality of the paper, and the high cost of maintaining that storage; lost folders requiring the folder to be re-created; and a backlog of paper waiting to be filed, that may not be in the folder when it's needed.

The problems with paper-based systems are exacerbated by the continued increase in the offender population. As the offender population grows, the prisons and jails become more crowded. To accommodate the overcrowding, more and more offenders must be moved to parole or put on probation. More offenders mean more paper work to track them. The paperwork becomes more pendulous as more offenders crowd the prisons and jails, the probation and parole offices. As the facilities become more crowded, sentences become shorter; inmates are shifted earlier to parole; more offenders are put on probation. As the turnover of the offender population increases, the paperwork increases disproportionately to create incoming diagnostic reports; to respond to correspondence from the offender's family, victim, or the public; to respond to violations, good time credits, appeals, detainees; to reschedule advances or set backs or cancellations in hearing dates; to provide investigative reports for hearing and home plans; to monitor progress; and to ensure proper releases by checking for outstanding warrants, detainees, and sentences. Streamlining the processing of paper is expected to provide sufficient productivity increases for the Board of Probation and Parole staff to eliminate the growing backlog and to handle the increased workload.

A full workflow project must address a multitude of areas. An accounting of those areas shows the following candidates:

Face Sheets and Sentence and Judgment
Parties Interested in Hearings
Photographs
Detainers
Inmate Correspondence
Public Correspondence
Appeals
Inmate Violations
Travel Permits
Progress Reports
Probation/Parole Violations
Returned Absconders
Schedule Hearings
Attendee Notification
Assign Teams
Investigation Requests
Interstate Moves
Interstate Case Closing
Interstate Violations
Board Hearings

While all of the noted areas are significant, selection of a single area is justifiable as an image pilot. Implementation of a pilot will provide tangible proof of the key component of benefit of an image system, value provided by the digitized image. In the case of the Board of Probation and Parole that value is measured in the form of reduction in storage space, security, quick retrieval. The value will continue for as long as access to the image is required, in this case beyond all legal retention limits.

Mugshot Project:

Fingerprint Image Project:

COMMITTEE RECOMMENDATIONS

Action Items:

The DP Manager's Imaging Subcommittee has, through their discussions, developed a series of recommendations to administer the implementation of imaging for state agencies. The recommendations cover the areas of platform residency, software solutions, product selection and contract award, project funding, and on-going support. The recommendations of the Subcommittee are as follows:

1. The mainframe-computing platform should be included in the State's imaging solution and should serve to provide for the indexing of images to legacy data resident in agency databases. If possible a single indexing software solution should be identified and become the standard for the State.

2. The midrange-computing platform should be included in the State's imaging solution and should serve as the central platform for image software implementation. Further, given the extensive presence of the AS/400, it should be designated as the midrange platform of choice to support image processing. A single imaging software solution capable of interfacing with the mainframe image indexing software should be identified and become the standard for the State. The burden of indexing software interface should rest with the selection of the mainframe software; that is to say, any mainframe software selected must conform to the State's AS/400 solution.

3. The micro-computing platform should be included in the State's imaging solution with the software solutions expected to be available for DOS, OS/2, UNIX/AIX, and Macintosh. Multiple solutions in any one of the platform areas should be allowed only when an existing contract has been demonstrated not to be satisfactory for the specific agency project.

4. That decision item(s) will be prepared annually to support the expansion of imaging in state government.

5. That every agency have the option to include their imaging project in a consolidated decision item to be included in the Office of Administrations budget or submit it as an agency decision item in their own budget.

6. That all decision items should be packaged as a program and presented at all participating agency budget hearings as an integrated program.

7. That each agency be responsible for developing the specifics of a decision item request and be responsible for submitting their request sufficiently soon enough to be included in the common imaging decision item.

8. That agencies submitting decision items for inclusion in the common imaging decision item in the Office of Administrations budget be responsible for establishing the priority of projects included in the decision item.

9. That the DP Manager's Group establish an Imaging Users Group. The imaging Users Group will have the responsibility of furthering the use of imaging in state government. Additionally, the Image Users Group is charged with enforcing the standards associated with the introduction and expansion of imaging technology in state government.

10. That all contracts established for imaging technology be established as cooperative procurement contracts in order to allow maximum agency utilization.

11. That evaluation criteria for imaging technology Invitations for Bid have cost point evaluation weighting established at no more than 50%.

12. That the Division of Purchasing and Materials Management be instructed not to accept an Invitation for Bid unless it has the endorsement of the DP Manager's Group. Endorsement will be granted upon recommendation of the Image Users Group. Recommendation to allow additional invitations for bid to be developed are based upon the requesting agency's ability to demonstrate

that existing contracts and solutions will not meet the needs of their specific project. This recommendation establishes peer review of imaging technology needs and helps to limit the number of imaging technology solutions available in order to increase the level of standardization and inter-operability.

Pilot Projects

After discussion among the Subcommittee members and additional consultation with agencies having submitted candidate projects the following projects are recommended for inclusion in the Fiscal Year 1996 Joint Imaging Project.

Department of Economic Development

Division of Professional Registration - License Renewal: There are approximately 300,000 professional licenses in the State of Missouri that are renewed on an annual basis. This exercise involves more than 40 professions (certified public accountants, M.D.'s, D.O.'s, professional engineers) and 28 boards. The license renewal process accommodates a turnaround document produced by the State and any relevant documentation submitted by the licensees to a central receiving room (CRR). An image system is being investigated which would enable the CRR to capture the submitted documents, automate the renewal processing, and make the relevant documents available to the respective boards. This would expedite the processing of renewals, decrease accounting errors, reduce the loss and misfiling of renewal documents and enable the information to be made available to multiple users.

Project Cost Estimates

Hardware (File server, CD ROM Tower, Scanner)	$ 25,000
Software	$ 35,000
Contract Services	$ 24,000
Personal Services	$ 0
	$ 84,000

Division of Liquor Control

Licensing File: The areas of Liquor Control operations that are affected by this project include liquor licensing, liquor, wine, and beer brand registration, correspondence, and administrative forms management. Liquor licensing files are growing rapidly. The bulk of the files consist of license application forms, supporting documents, and photographs. These documents are in frequent demand and the rate of inquiry continues to increase. Inquiries are received from various State Divisions, liquor industry members, and litigation officials. Efficient access and quality reproduction capabilities are a necessity in managing liquor license documents.

Liquor, wine, and beer brand registration management requires that a copy of the product label be on file with the Division of Liquor Control. Documents supporting the management of brand registration are necessary to insure proper registration of products in Missouri. These files are growing rapidly and with administrative access increasing electronic storage and access have become critical to being able to the Division's ability to provide efficient services in this area.

Correspondence and administrative documents, i.e., expense accounts, time sheets, purchase orders, etc., are too voluminous to effectively manage in paper form. The need for imaging is very real in this area if the Division is to continue to be effective.

In each of the four areas identified imaging technology will provide a much-needed solution to the problems of workflow efficiency, document retrieval, and physical storage.

Project Cost Estimates

Hardware	$ 133,991
Software	$ 63,742
Contract Services	$ 0
Personal Services	$ 13,728
	$ 211,461

Department of Natural Resources

The Department of Natural Resources (DNR) is in the process of conducting an Information Strategic Plan (ISP) for the entire department. At this time, there are several projects that are being considered as the document imaging pilot projects. Because the ISP process is not complete at this time, the Hazardous Waste Program document-imaging project may not be identified as the most critical need for FY96. In every instance however, the projects undertaken at DNR will be consistent with recommended Action Items of this document. In addition, DNR's objective is to implement citizen access to the information and the Information Engineering Facility (IEF) methodology as an integrated feature of all future projects.

Hazardous Waste Program: The Department of Natural Resources has reviewed the filing system used within the Division of Environmental Quality (DEQ). The division's filing system cannot keep pace with the volume of paper it is required to maintain by State and Federal legislation. In addition, the central filing system contains an estimated 26 million document pages. Duplicates of many of the documents are required at other sites, i.e., St. Louis, Kansas City, Springfield, Washington, etc. DNR plans to begin the implementation of document imaging in the Hazardous Waste Program of DEQ. The program has been chosen because it has the equivalent of 3,300,000 paper documents and receives another 2,000 documents per day, (4,000 on a peak day). The program has also gone through a file reorganization and purging effort in the past two years resulting in:

- A computer file indexing application

- The staff has access to the file index on DNR's local area network

- Elimination of duplicate and extraneous documents

Project Cost Estimates

Hardware	$1,120,000

Software	$ 150,000
Contract Services	$1,227,000
Supplies and Equipment	$ 350,000
Personal Services	$ 442,000
	$3,289,000

NOTE: DNR costs are not be included in the Office of Administration's Decision Item due to federal grant matching requirements. The project is to be considered as part of the total imaging project.

Office of Administration

Division of Personnel Imaging: The Division of Personnel needs to significantly upgrade its data processing and office automation capabilities. This will enable staff to be more fully productive and to meet the information needs of our customers. While other agencies have upgraded their capabilities two or even three times, the Division of Personnel has never truly completed a first implementation. This project is designed to implement the upgrade and completion of Division of Personnel data processing and office automation capabilities. The project includes two categories of office automation capabilities:

New Workstations: Purchase of 15 new AS/400 compatible workstations to expand our use of current Office of Administration systems. This workstation base would be necessary for the "imaging system" and the other capabilities provided.

Imaging System: An employment application imaging system, including in-house processor and storage, to support important services to our application and agency customers. An imaging system is essential to supporting the Department of Mental Health's "Reinventing Government" initiatives for the development of a new selection system based on a database of skills and for the provision of applications to agencies.

Project Cost Estimates

Hardware	$ 5,000
Software	$105,000
Contract Services	$ 0
Personal Services	$ 0
	$150,000

Department of Corrections

Probation and Parole Workflow: The Board of Probation and Parole in studying an efficient approach to workflow has the following goals:

- Document a representative current workflow and procedure
- Identify the problems associated with a paper-based system

- Propose a representative paperless environment workflow

- Document benefits associated with implementing a paperless environment

Any paper-based system is fraught with problems associated with that media: long retrieval times when a client is on the phone and an answer is needed; manpower needed to file the paper in the proper order in the folder, then to file the folder, and to retrieve it again when it's need; misfiling resulting in lost time; proper storage to maintain the quality of the paper, and the high cost of maintaining that storage; lost folders requiring the folder to be recreated; and a backlog of paper waiting to be filed, that may not be in the folder when it's needed.

The problems with paper-based systems are exacerbated by the continued increase in the offender population. As the offender population grows, the prisons and jails become more crowded. To accommodate the overcrowding, more and more offenders must be moved to parole or put on probation. More offenders mean more paper work to track them. The paperwork becomes more pendulous as more offenders crowd the prisons and jails, the probation and parole offices. As the facilities become more crowded, sentences become shorter; inmates are shifted earlier to parole; more offenders are put on probation. As the turnover of the offender population increases, the paperwork increases disproportionately to create incoming diagnostic reports; to respond to correspondence from the offender's family, victim, or the public; to respond to violations, good time credits, appeals, detainees; to re-schedule advances or set backs or cancellations in hearing dates; to provide investigative reports for hearing and home plans; to monitor progress; and to ensure proper releases by checking for outstanding warrants, detainees, and sentences. Streamlining the processing of paper is expected to provide sufficient productivity increases for the Board of Probation and Parole staff to eliminate the growing backlog and to handle the increased workload.

A full workflow project must address a multitude of areas. An accounting of those areas shows the following candidates:

Face Sheets and Sentence and Judgment
Parties Interested in Hearings
Photographs
Detainers
Inmate Correspondence
Public Correspondence
Appeals
Inmate Violations
Travel Permits
Progress Reports
Probation/Parole Violations
Returned Absconders
Schedule Hearings
Attendee Notification
Assign Teams
Investigation Requests
Interstate Moves
Interstate Case Closing
Interstate Violations
Board Hearings

While all of the noted areas are significant, selection of a single area is justifiable as an image pilot. Implementation of a pilot will provide tangible proof of the key component of benefit of an image system, value provided by the digitized image. In the case of the Board of Probation and Parole that value is measured in the form of reduction in storage space**,** security, quick retrieval. The value will continue for as long as access to the image is required, in this case beyond all legal retention limits.

Project Cost Estimates

Hardware	$100,000
Software	$300,000
Contract Services	$ 0
Personal Services	$ 89,052
	$492,052

FY96 Decision Item:

Project Priorities: In order to present the proposed decision item, it is important to be able to speak to the priorities of the projects submitted. The recommended project priorities for the FY96 decision item are:

I.
2.
3.
4.
5.

Cost Benefit Analysis: In order to substantiate the need for funding for new technology it is necessary to address the return on investment that can be expected and at what point benefits will be realized from the individual projects relative to their cost. The cost benefit analysis associated with each of the recommended projects is as follows:

Division of Professional Registration - License Renewal:
Division of Liquor Control - License File:
Department of Natural Resources - Hazardous Waste Program:
Office of Administration Division of Personnel - Imaging:
Department of Corrections Probation and Parole Workflow: